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RESEARCH ARTICLE



## Public support for aviation policy measures in Sweden

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### ABSTRACT

Air travel has received increasing attention in the climate debate in recent years. Current climate policy in this sector remains weak in comparison to, for example, the road transport sector. In this study, we analyze public support for seven different national policy measures that have been chosen to reflect the main thinking raised in the debate. Using original data from Sweden ( $N = 4500$ ), we found that less coercive measures, as well as regulatory measures targeting the aviation industry rather than individuals directly, are more readily supported by the public than market-based policies aiming to push individuals away from air travel. The analyses of the different policy measures reveal many similarities between them. Climate concern, a personal norm to act in a more climate-friendly way, a political orientation to the left and high levels of institutional trust all display strong associations with support for all the different policy types. Perceptions of fairness, in particular, and effectiveness were strongly associated with overall policy support. Interestingly, however, the extent to which a policy measure was expected to affect one's own personal freedom was found to have a very weak correlation with policy support.

### Key policy insights

- Public support was higher for 'pull' policies (climate labelling and subsidies for high-speed and night trains), as well as for regulatory measures targeting the aviation industry (biofuel blending mandate), than for policies that aim to push individuals away from air travel (e.g. air passenger tax).
- The weakest public support was found for frequent flyer taxation and personal carbon allowances. One reason, however, may be that these are novel policy options where the respondents had little prior information.
- In line with previous research, climate concern, ideology and trust in institutions correlate with attitudes to aviation policies, but the multivariate model showed that perceptions of whether a policy is fair and effective were by far the most important variables. Hence, fairness and effectiveness appear to be crucial aspects for the design of new policies.

### ARTICLE HISTORY

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Policy measures; Public support; Aviation; Sweden

## 1. Introduction

How and why do public attitudes towards climate policy measures in the aviation sector vary between different types of policies? Global civil aviation flights produced 895 million tonnes of CO<sub>2</sub> in 2018 (ATAG, 2019), accounting for 2.7% of all energy-related CO<sub>2</sub> emissions (IEA, 2019). In addition, aviation also causes short term non-CO<sub>2</sub>-effects from high altitude emissions of water vapour that form warming contrails and cirrus clouds, as well as nitrogen oxides that form ozone. The magnitude of these non-CO<sub>2</sub>-effects is highly uncertain, but the best

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scientific estimates show that the total effect from aviation is about 1.9 times as high as the effect from the CO<sub>2</sub> emissions alone<sup>1</sup> (Lee et al., 2010). Air travel is continuously growing on a global scale, increasing aviation's share of human climate impacts, and for high income countries, air travel already accounts for a large share of the climate footprint. A recent Swedish study, which also included all international trips by the Swedish population, found that air travel emissions are on par with emissions from car driving (Larsson et al., 2018).

The current climate policy regime for the aviation sector is weak in relation to the emission reductions required to meet the 2°C target enshrined in the 2015 Paris Agreement, and also much weaker than in the road transport sector. The preferred choice for regulating global activities like aviation is global policy instruments, since they reduce the risk of carbon leakage as well as administrative costs (European Commission, 2019; Larsson et al., 2019). However, jet fuel for international aviation is exempt from taxes based on a resolution by the International Civil Aviation Organization (ICAO, 1993). ICAO has instead decided to implement a Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) with the aim of achieving 'carbon neutral growth' from 2020 (ICAO, 2016). However, CORSIA is often criticized on several grounds, e.g. that it only covers the increase of emissions after 2020 and that the additionality associated with offsetting projects is problematic (Becken & Mackey, 2017; ICCT, 2017; Scheelhaase et al., 2018; Zanin et al., 2016). Since 2012, CO<sub>2</sub> emissions from flights within the EU are included in the EU Emissions Trading System (EU ETS) (European Commission, 2014). Despite the fact that the EU ETS is a more stringent policy, a case study of Sweden shows that it only covers one third of the emissions from air travel, since the scope includes neither intercontinental flights nor the non-CO<sub>2</sub>-effects of air travel (Larsson et al., 2019). Policymakers who want to significantly push the aviation sector to contribute to meeting the 2°C target need to work towards putting in place tougher international policy instruments in the long term, and simultaneously to implement temporary national policy instruments in the near term. Examples of aviation policies that can be decided at the national level are distance-based air passenger taxes, which have been implemented in many countries (in Sweden since 2018), biofuel blending mandates (SOU, 2019, p. 11) and compulsory climate performance labelling (von Bahr et al., 2018).

Using Vedung's (2011) tripartite classification of policy measures as sermons, sticks and carrots, the primary distinction between different types of policy measures is the amount of coercion they imply. Whereas the sermon refers to information (or nudges, cf. Thaler & Sunstein, 2009) such as eco-labels, aiming to change both attitudes and patterns of behaviour, the stick rather implies a command-and-control strategy where certain behaviours are simply made unlawful, and the carrot strategy typically includes economic incentives. Evaluating the merits of different policy instruments is, however, a complex task, as they need to be both effective in targeting the overall problem as well as politically viable, enjoying the support of both the public and the policy makers themselves. As has become evident, not least within global climate policy (Feldman & Hart, 2018; Harrison, 2010, 2012; Jagers & Matti, 2010; Löfgren & Nordblom, 2009; Rabe & Borick, 2012; Shwom et al., 2010), faltering public support undermines political attempts to introduce new policy measures, as policy makers are unwilling to risk igniting unfavourable public opinion (e.g. Burstein, 2003; Wallner, 2008). However, recent research has also argued that negative public attitudes can be alleviated through careful policy design, e.g. affecting the perceived fairness and effectiveness of a policy measure (see Section 2).

Although there is a rather broad literature on public support for climate policy measures (see Section 2.1), relatively few studies have addressed the specific case of support for aviation policy, and even fewer compare the mechanisms of support between different policy types. Nonetheless, understanding how and why certain policies are supported and others not, is key to future policy development. A number of studies focus on one specific intervention such as travellers' willingness to pay (WTP) for carbon offsetting (Brouwer et al., 2008; Choi, 2015; Lu & Shon, 2012) or support for carbon taxes for aviation (Sonnenschein & Smedby, 2019). More similar to the scope of the present study, Kantanbacher et al. (2018) analysed public attitudes to a range of different climate policy options for aviation. In a sample of British adults, they found relatively strong support for several policies, particularly those that place the burden on industry rather than on individuals directly. Our study builds on Kantanbacher et al. (2018) in order to fill the research gap of analyzing support for different aviation policy types. Additionally, and in contrast to Kantanbacher et al. (2018), we also consider how the mechanisms behind policy support varies across policy types, going beyond standard socio-economic categories. To facilitate this, we include several individual-level factors (norms, concern, political ideology, trust)

as well as factors tied to the perception of the policy type (perceived fairness, effectiveness and consequences for freedom) in our models. Thus, the study provides a more in-depth understanding not only of levels of support, but also of the reasons behind them.

Our aim is both to advance the theoretical understanding of how different policy types trigger different attitudinal responses, and to provide relevant empirical insights for decision makers endeavouring to devise novel policy tools for aviation. Our specific research questions are:

- (1) How does overall public support vary between different aviation policy types?
- (2) Is the level and variation of policy support for aviation policy measures similar among individuals with different political-ideological orientations?
- (3) To what extent is aviation policy support affected by (a) factors tied to the individual, and (b) policy-specific beliefs, such as perceived effectiveness, fairness and consequences for personal freedom?

## 2. The necessity of policy support

The climate targets under the Paris Agreement cannot be expected to be achieved by voluntary individual efforts alone. Rather, the collective action problem of many actors cooperating around the provision of a public good requires third-party intervention (Mansbridge, 2014) in order to make actors work towards a common goal. At the national level, these interventions take the form of policy measures targeting unsustainable behavioural patterns. However, a range of literature also points to the necessity for policy measures to be publicly supported in order to be decided upon by politicians and to safeguard their long-term survival (c.f. March & Olsen, 2004; Matti, 2010; Ostrom, 2005). There is ample evidence that public opinion both constrains and directs the actions of decision makers (Soroka & Wlezien, 2010), as vote-maximizing politicians are unlikely to risk unpopularity by supporting policies that might be received poorly by the electorate (Burstein, 2003).

Attempts to explain the mechanisms behind environmental public policy support have guided researchers to target contextual as well as individual factors. In the literature focusing on the former, cross-national variations in policy implementation have been attributed to, for example, political climate and party polarization (Linde, 2018), national economic dependencies (Harring et al., 2019; Kenny, 2018; Ščasný et al., 2017), political culture (Cherry et al., 2014), wealth and affluence, and quality of government (Harring, 2014). In countries with high corruption, and lower trust between people, policies with a higher degree of coercion are often preferred since they reduce the risk of free-riding (Harring, 2014). Although these studies help our understanding of why different states choose to implement different types of policy measures, they reveal less about the mechanisms driving policy support at the individual level. Therefore, to fully grasp within-country variations in policy support, individual-level factors also need to be considered.

Studies of individuals' environmental policy support have traditionally targeted various forms of individual, values-based pro-environmental motivation as the key explanation (c.f. Schleich et al., 2018; Steg et al., 2005). Values-based models, such as the Value-Belief-Norm (VBN) model (Stern et al., 1995), assert that individuals' behaviour is the result of a causal chain of value priorities and environmental beliefs, which originate in a personal norm telling the individual to behave in a certain way.

Apart from individual motivation, the concept of trust has become a central topic of inquiry in political science studies aiming to better grasp the nature of collective action problems in modern society (Uslaner, 2002). Trust in the political system's ability to decide, implement and enforce policy measures in a way that caters for high levels of compliance, fairness and efficiency has been demonstrated to be decisive for policy support (Harring, 2014). Thus, unless people trust the competence of either politicians or political institutions to understand the problem at hand and know what is required to fix it, they will not be inclined to support policy measures, in particular if these imply a high level of personal sacrifice (Hetherington, 1998; Rudolph & Evans, 2005). A range of studies have found that a lack of trust in government, and in particular in government's use of the revenues generated from taxes, is a key explanatory factor for low levels of public support (Dresner et al., 2006; Hammar & Jagers, 2006; Kallbekken et al., 2013).

In addition, as different policy types vary both in terms of the level of coercion and their distributional effects, we could moreover expect that policy attitudes, at least to a certain extent, are ideologically constrained. The

effect of ideological left-right orientation on policy attitudes has been confirmed in a number of studies (Häkkinen & Akrami, 2014; Jagers et al., 2018), where an ideological positioning to the right is connected to less favourable attitudes towards government regulation and free-market interventions.

As plenty of research demonstrates, there are also significant variations in support across different policy designs, where more coercion usually reduces support, as coercive measures are perceived as both more unfair and more infringing on personal freedom of choice (Eriksson et al., 2006; Steg et al., 2005). Furthermore, recent experimental studies (e.g. Jagers et al., 2019) also demonstrate how altering policy design can be a route towards ameliorating some of these negative perception-based sentiments.

The individual's evaluation of a policy measure's consequences is hypothesized to be based on at least four dimensions (e.g. Samuelson & Messick, 1995). Firstly, *Personal outcome expectancy* refers to the extent to which the implementation of a policy instrument is expected to imply consequences in terms of higher costs for the individual (Jakobsson et al., 2000; Joireman et al., 2001; Schuitema et al., 2010). Individuals' decisions not to support the introduction of a specific policy instrument tend to be motivated by consequences for their personal utility and a lack of alternative behaviour options (c.f. Guagnano et al., 1995). Social norms determine what is socially approved within the specific context or collective, and can thereby both hinder and promote expressions of acceptance for political initiatives in a manner similar to other resource-related costs (Cialdini et al., 1990).

Secondly, attitudes towards new policy measures are based on their perceived *distributional effects*. More precisely, the extent to which the consequences of a policy instrument are perceived as fair is highly significant for the degree of acceptance it receives (Bamberg & Rölle, 2003; Fujii et al., 2004; Jakobsson et al., 2000; Johansson-Stenman & Konow, 2010; Joireman et al., 2001; Schuitema et al., 2011). However, perceptions of fairness are not always tied to the type of policy instrument, but rather to perceived consistency regarding the design of a specific scheme and, not least, the suggested use of its generated revenues (Dresner et al., 2006; Kallbekken & Sælen, 2011).

Thirdly, the extent to which a policy instrument is perceived to impact the individual's *freedom of choice*, and thus whether its implementation necessitates a change in behaviour, seems to affect acceptability both directly and indirectly: directly, as coercive push-measures are generally less supported (Matti, 2010); and indirectly, as significant infringements of personal freedom of choice are also understood as being less fair (e.g. Eriksson et al., 2006).

Lastly, perceptions of the measure's *effectiveness*, or the extent to which a policy instrument is expected to achieve the aims it is introduced to achieve, is interlinked with an individual's policy support in several ways. Some studies note the negative correlation between perceptions of ineffectiveness and support for a policy measure (Jagers & Hammar, 2009; Kallbekken & Sælen, 2011), but it can also be the case that individuals find a policy to be unattractive and therefore view it as ineffective (Bolderdijk et al., 2017). Secondly, there is ample evidence that, in particular for more coercive measures, perceived effectiveness is linked to perceived fairness. Confidence in the policy measure's ability to contribute to a common good is positively linked to a perception of its consequences as fair (Bamberg & Rölle, 2003; Eriksson et al., 2006). All in all, this highlights the significance of incorporating policy-specific beliefs when theorizing policy support, but also of controlling for how these beliefs are affected by different policy types.

### 3. Case, data and measurements

In order to explore variations in policy attitudes, and if and how different policy types trigger different responses, this article compares public reactions to seven different policy measures, varying by type and level of coercion. In the wake of the increased attention on climate change, there is an ongoing public debate about the possibilities of introducing national policy measures targeting the aviation sector. In this article, we have chosen Sweden as a case for analyzing acceptance among the public. Over the past few years, Sweden has experienced an intense public debate about the climate impact of aviation, which can be exemplified by the establishment of the word 'flygskam' (flight shame). In a recent poll, 35% of Swedes declared an intention to make fewer international trips in the future (Vagabond, 2019), and statistics on air travel for 2019 show a decline by 8% for domestic flights and 5% for international flights (compared to forecast) (Kamb et al.,

2020). There is an intense political discussion on a range of other potential policies. This situation makes Sweden an interesting case as a potential policy innovator. The debate about climate policies for aviation has raised public awareness, which makes analysis of policy support more reliable, compared to samples that have not encountered these issues. The absolute levels of support can be expected to be higher in Sweden than in other countries (Harring et al., 2019; Jagers et al., 2017), but our focus is primarily on differences in support between policy types as well as the underlying mechanisms for support. These results can be more generalizable to other countries.

Much of the previous research on emission reductions related to air travel have focused on voluntary carbon offsetting (e.g. Hardisty et al., 2019; Ritchie et al., 2020), whereas this study focuses on potential public policies that have been suggested by scholars, politicians and NGOs. In this article, we analyse acceptance of policies that can be decided at the national level. Potential international aviation policies that need support from many countries, such as a strengthening of the EU ETS or CORSIA, are therefore excluded. So is a global tax on jet fuel, since it is restricted according to a resolution from ICAO (1993) (but not, as often incorrectly stated, due to the Chicago Convention from 1944, which only prohibits taxing the fuel in the tanks of arriving aircraft). The seven policy measures compared in this study were chosen to reflect the main thinking raised in this debate. Air passenger taxes have been implemented in many countries (European Commission, 2019; Faber & Huigen, 2018) and green parties are pushing for increased tax levels. A British environmental organization is advocating a tax model which they call a frequent flyer levy (A free ride, 2019). Public policies stipulating an obligation to use biofuels have been implemented in Norway and Sweden (Kantenbacher et al., 2018; Larsson et al., 2019; SOU, 2019, p. 11). Personal carbon allowances is a form of individualized cap-and-trade policy (Jagers et al., 2010), which has also been proposed for air travel specifically (von Bahr et al., 2018). Investment in rail is a common proposal for reducing air travel emissions; here, subsidies for high-speed trains and for night trains are included since these two options are discussed in Sweden's climate debate. Finally, an information policy is included in the form of compulsory climate labelling on advertisements for flights (; Åkerman et al., 2016; SOU, 2019, p. 11; von Bahr et al., 2018). Table 1 shows how the policy measures were framed and presented to the respondents, along with their level of coercion and the way their effects target the individual consumer.

The data in this study come from an online survey included in wave 31 of the Swedish Citizen Panel administered by the Laboratory of Opinion Research at the University of Gothenburg ([www.lore.gu.se](http://www.lore.gu.se)). The fieldwork lasted 26 days, from 12 September to 7 October 2018. In total, the Panel has some 60,000 voluntary respondents, recruited using both probability and non-probability methods, who regularly get invited to take surveys on a wide range of topics. No payment is made to the Panel participants. For this study, a gross sample of 7,500 respondents was used, stratified according to age, sex and education based on benchmark data from Statistics Sweden. After two reminders, the response rate was 60%. The participant sample is fairly representative of the Swedish adult population with a slight overrepresentation of men (52%). The age range of the sample is from 18 to 70 years, with a mean of 47. The sample is also fairly representative in terms of education, with 27% having completed three years or more of higher education. In terms of ideology, the sample is slightly left-leaning, with a mean of 4.62 on a 0–10 scale going from left to right.

When agreeing to participate in the survey, each respondent was given an introductory question asking them to indicate their attitude (from very negative to very positive) towards the current Swedish aviation tax of about 6 Euro for flights within the EU, and up to about 40 Euro for the longest intercontinental flights. Thereafter, all participants were asked about their attitudes towards an increased aviation tax<sup>2</sup> and, after that, their attitudes towards two additional, randomly assigned, policy measures. In total, about 1,700 respondents answered questions on each of the 5 policy measures, and about 700 on the tax.<sup>3</sup> The main dependent variable, policy support, was measured by one item asking the respondents to state their attitude to the policy proposal ('If you consider the proposal as a whole, what is your attitude towards this proposal?') on a scale from 1 (very negative) to 7 (very positive), with 4 being the scale midpoint. Following their overall attitude, the respondents' perceptions of the proposed policy's consequences were also investigated. Following previous research on such policy-specific beliefs (Eriksson et al., 2006; Jagers et al., 2018; Kallbekken et al., 2013), respondents were asked to indicate to what extent they found the proposal to be fair and effective, and whether or not it negatively affected both their personal freedom and their personal finances.<sup>4</sup> All responses were given on a 7-point



scale (very unfair/very fair, very ineffective/very effective, no negative impact at all/considerable negative impact). Perceptions of fairness and effectiveness were measured on a scale running from -3 to +3 and were then recoded as 1–7 in order to facilitate the analysis.

Thereafter, a number of other questions were asked to capture other factors demonstrated to be important for policy support throughout the literature (Matti, 2015). Individual values-based motivation was evaluated through items asking about climate concern ('I am worried about changes in the global climate', ranging from 1 = do not agree at all, to 4 = completely agree), and personal norms ('I feel a moral duty to do something about the climate problem', ranging from 1 = do not agree at all, to 4 = completely agree). Political-ideological orientation was measured by a self-placement item ('It is sometimes said that political opinions can be placed on a left-right continuum. Where would you place yourself on such a left-right continuum?') where the respondents indicate their position on a continuum from far to the left (0) to far to the right (10), with 5 marked as neither left nor right. Respondents replying 0–3 were labelled Left (36%), 4–6 Centre (38%) and 7–10 Right (26%). The item on institutional trust is an index comprised by the respondent's level of trust in the Swedish parliament, the Swedish government, Swedish authorities and political parties, respectively (answers ranging from 1 = very little trust to 5 = very great trust).

Finally, a number of further control variables were included in the survey: perception of social norms ('People around me see it as important to do something about the climate problem', ranging from 1 = do not agree at all, to 4 = completely agree) sex, age, education, income, place of residence (dummy variables for urban/rural/abroad with medium-sized town as the reference category), and number of flights per year.

## 4. Results

The results are divided into two sub-sections where the first compares overall public support for the different policy measures and the second contains the results for the variation in policy support at the individual level.

### 4.1. Overall policy support

As illustrated in Figure 1, the means for public support for the different policy measures range from 3.25 to 5.08 on a scale from 1 to 7 (with 4 thus being the scale mid-point). However, it should be remembered that since our sample is not fully representative for the Swedish population, absolute levels of support for a specific policy instrument should be interpreted with caution.

Nonetheless, comparing support for the different measures included in the study, we note that policies supporting both high-speed and night trains are among the more popular. This is hardly surprising, for several reasons. A number of previous studies have demonstrated (Jagers & Matti, 2010; L. Steg, 2005) that pull-measures attempting to present viable alternatives to unsustainable behaviours are usually more readily supported than push-measures exacerbating the negative impact of a behaviour, simply because they imply a lower direct personal cost (our survey items specify that tax revenue is used to finance the train subsidies). Another interpretation is that people might view the establishment of alternative modes of transport as crucial for achieving reduced emissions.

The biofuel blending mandate for the aviation sector also has a relatively high popularity and, as shown by Figure 1, the share of respondents with negative attitudes (1–3 on the 1–7 scale) is only 18%, which is lower than for any of the other policy measures. Biofuels are generally viewed in the debate in Sweden as a good way to reduce GHG emissions (SOU, 2019, p. 11) and this policy measure also places the burden more directly on the aviation industry, which has previously been found to lead to stronger support than policies directed at individuals (Hardisty et al., 2019; Kantanbacher et al., 2018). Even though this would lead to higher ticket prices, the coercion directed at citizens is lesser and more indirect than for the tax proposals. Not surprisingly, the soft policy instrument of climate labelling is also relatively popular. Again, this attracts a higher level of support compared to more coercive, and costlier, measures. The comparatively low support for implementing personal carbon allowances could be explained in a similar way; this measure could have drastic consequences for individuals with a need and/or desire for more extensive air travel.



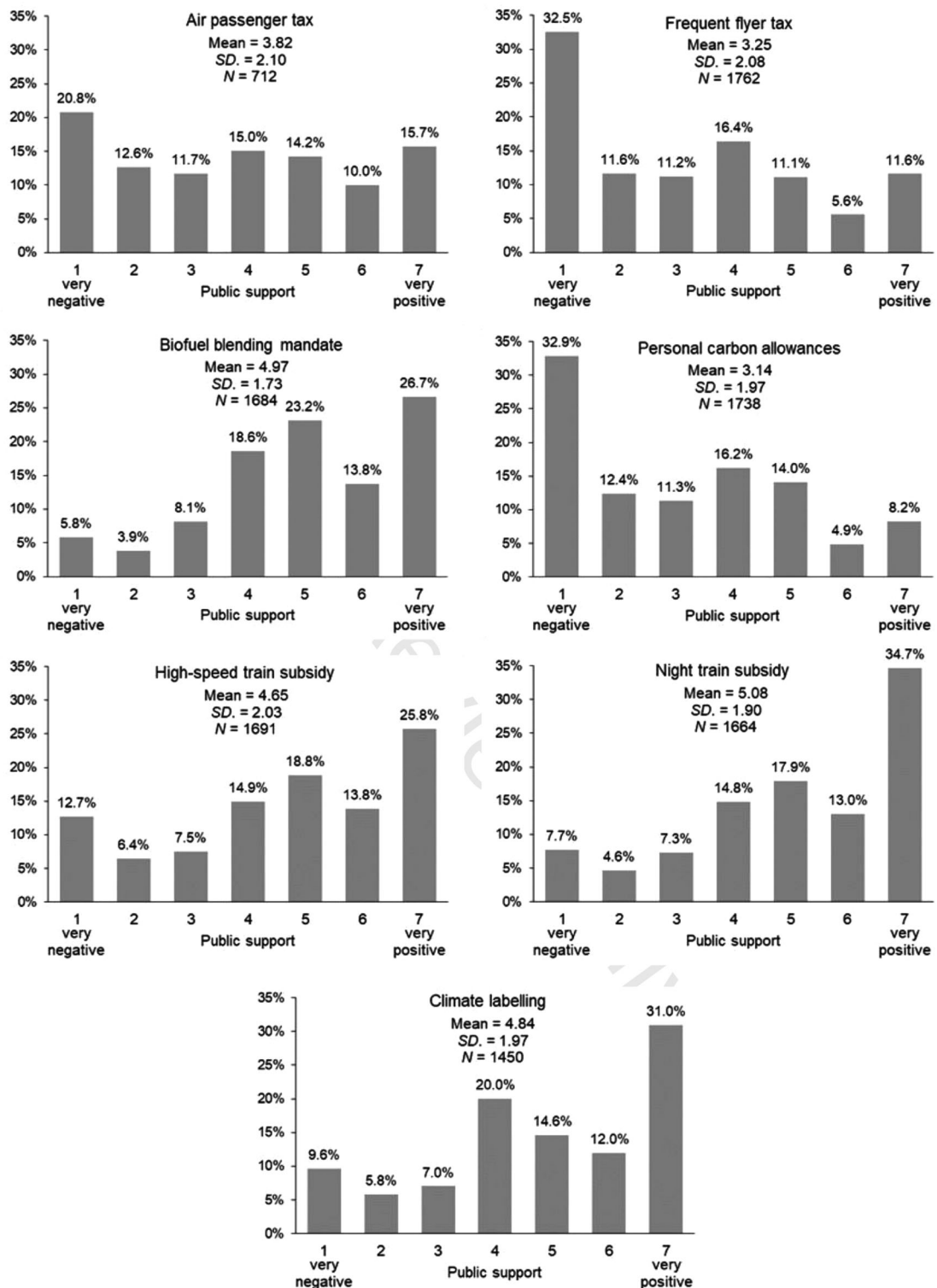


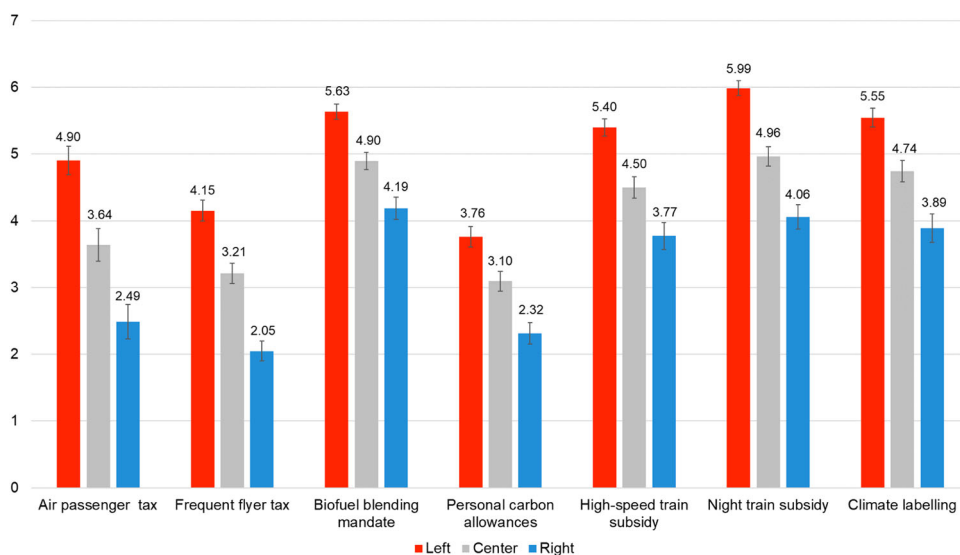
Figure 1. Overall public support for seven different aviation policy instruments (scale 1–7).

The suggested air passenger tax is also relatively unpopular, probably at least partly due to the magnitude of the proposed increase (130 Euro for intercontinental flights, a fourfold increase of the current tax level). However, environmental taxes in general have low popularity levels compared to other, more pull-oriented, measures.

We also tested another alternative design for a tax policy instrument: a frequent flyer tax, where the first trip in a year attracts no increase in the tax level, but where each additional trip would attract twice the tax increase (260 Euro, instead of 130 Euro, for intercontinental flights) described in the survey item for an increased air passenger tax (which here is called the basic tax option to distinguish it from the frequent flyer tax). The overall support for this frequent flyer tax was lower in all groups than for the basic air passenger tax, irrespective of how much people were flying. The frequent flyer tax is promoted by UK activists as a fairer option since it spares ordinary holidaymakers but instead impacts people who fly often (A free ride, 2019). In our sample, the basic air passenger tax would have been paid by 64% of the respondents (i.e. those who took at least one private flight last year), while only 40% of the respondents would have paid the twice-as-high frequent flyer tax (i.e. those who took two or more private flights last year). Compared to the basic air passenger tax, people who fly only once per year would be better off financially with the frequent flyer tax, those who fly twice per year or don't fly at all would have the same outcome, while those who fly three times or more would have to pay more tax.

Looking at the frequencies of answers in Figure 1, we can see that they are far from normally distributed. For most policy instruments, the neutral position (4) is more common than the moderately negative (2, 3) and moderately positive (5, 6), but we also see high frequencies of the more extreme positions (1, 7). In particular, the policy instruments that imply direct costs for the traveller (the two tax instruments and personal carbon allowances) received a large share of very negative responses (1), whereas the night train subsidy and climate labelling received more than 30% very positive responses (7).

The next step in the analysis was to explore the role of left-right political orientation in policy attitudes. In practice, policy proposals need a parliamentary majority to be adopted and elected decision makers are sensitive to attitudes among voters (Burstein, 2003; Soroka & Wlezien, 2010; Wallner, 2008). Thus, policy proposals with relatively broad support from voters across the ideological spectrum have a better chance of being implemented and of being sustained in the future. In Figure 2, the respondents are divided into three groups based on their self-reported political orientation.



**Figure 2.** Policy support and political orientation. Bars show mean values including 95% confidence intervals. Red denotes voters with a political orientation to the left, grey at the centre of the scale and blue to the right.

**Table 1.** Aviation policy measures.

Short name	Full wording of the question	Level of coercion	Indirect/direct effects on individuals
Air passenger tax	In the public debate, the negative effects of aviation on the climate and the environment have been discussed. One proposal that has been put forth is to increase <sup>5</sup> the tax on air travel by SEK 200 for travel within the EU and by SEK 1300 for longer journeys in order to reduce this negative climate impact. The income from the increased aviation tax would be used to lower tax overall by an equal amount for all taxpayers, regardless of how much the individual is flying.	High	Direct
Frequent flyer tax	Another proposal that has been put forth is that all Swedish citizens are allowed to make one flight per year with today's low tax rate, but that the tax for additional flights is increased by SEK 400 for travel within the EU and SEK 2600 for longer trips.	High	Direct
Personal carbon allowances	Another proposal that has been put forth is to set up personal emissions accounts for all Swedish citizens, which allow yearly emissions from a certain amount of air travel per person. If the individual wants to fly more, emissions allowances must be bought from someone who does not fly.	High	Direct
Biofuel blending mandate	Another proposal that has been put forth is to introduce legal requirements for the aviation industry to use at least 5% biofuels in all aircraft, which also would mean an increase in ticket prices.	Medium	Indirect
High-speed train subsidy	Another proposal that has been put forth is to use tax revenues for a major investment in the expansion of high-speed train services between Gothenburg, Malmö and Stockholm.	Low	Indirect
Night train subsidy	Another proposal that has been put forth is to use tax revenues to establish night trains to Germany and France, for example.	Low	Indirect
Climate performance labelling	Another proposal is compulsory climate labelling on advertisements for flights, in line with what already exists for car advertisements. It might look like this: 'The climate impact from this trip corresponds to 2.3 tonnes of carbon dioxide'.	Low	Indirect

The results reveal that respondents with a political orientation to the left on average are significantly more positive towards all policy instruments than respondents with a political orientation in the centre, who are in turn more positive than respondents to the right. A one-way Welch Anova with Games-Howell post-hoc tests shows that all differences presented in [Figure 2](#) are statistically significant at the  $p < .001$  level. The largest effect size measured as  $\eta^2$  was found for Air passenger tax at (.19), followed by Night train subsidy (.16), Frequent flyer tax (.16), Biofuel blending mandate (.11), Climate labelling (.10), High-speed train subsidy (.10), and Personal carbon allowances (.08).

#### 4.2. Variation in policy support between individuals

In order to explore differences in the drivers behind the levels of support across our proposed policies, we conducted a set of OLS regressions using the overall attitude to the policy measure as the dependent variable. These analyses were conducted for each of the policy measures in the survey ([Table 1](#)) except for climate labelling, where the survey lacks estimates of policy-specific beliefs. In Model 1, we used the individual level factors as independent variables and included a range of commonly used controls alongside them. Policy-specific beliefs were added to the regressions in Model 2 for all policy measures. [Table 2](#) provides a bivariate correlation matrix along with mean values for all measures and [Table 3](#) displays the results from the OLS regressions.

Firstly, considering Model 1 across all policy measures, we noted that the analyses share many similarities. Climate concern, a personal norm to act in a more climate-friendly way, a political-ideological orientation to the left, and high levels of institutional trust all show significant effects (B-values between 0.11 and 0.33) in terms of support for all the different policies. Respondents with a political orientation to the right are consistently less supportive of policy interventions than voters to the left, but even less supportive of the two tax proposals and the train subsidies, which entail substantial state intervention. The biofuel blending mandate (which does not explicitly target passengers), where the market rather than the state would regulate access to air travel, appears to be a less polarizing proposal.

**Table 2.** Bivariate correlation matrix (Pearson's *r*) and mean values. N/a: not applicable due to different sub-samples.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	Mean
1. Air passenger tax (1–7)																	3.82
2. Frequent flyer tax (1–7)	n/a																3.25
3. Biofuel blending mandate (1–7)	n/a	n/a															4.97
4. Personal carbon allowances (1–7)	n/a	n/a	n/a														3.14
5. High-speed train subsidy (1–7)	n/a	n/a	n/a	n/a													4.65
6. Night train subsidy (1–7)	n/a	n/a	n/a	n/a	n/a												5.08
7. Personal norm (1–4)	.41***	.35***	.42***	.33***	.27***	.35***											3.20
8. Social norm (1–4)	.18***	.12***	.12***	.13***	.12***	.13***	.24***										2.51
9. Climate concern (1–4)	.46***	.41***	.42***	.36***	.30***	.41***	.59***	.25***									3.07
10. Political orientation (0 left–10 right)	−.43***	−.42***	−.34***	−.30***	−.33***	−.42***	−.31***	−.10***	−.41***								4.62
11. Number of flights per year	−.18***	−.22***	−.09***	−.12***	−.01	−.06*	−.03	.08***	−.06***	.16***							1.54
12. Institutional trust (1–5)	.28***	.24***	.35***	.21***	.26***	.27***	.32***	.23***	.32***	−.24***	.03						2.76
13. Gender (0 man, 1 woman)	.23***	.21***	.18***	.13***	.14***	.19***	.21***	.07***	.26***	−.17***	−.05**	.12***					0.48
14. Age	−.12***	−.08***	−.03	−.08***	−.15**	−.06*	−.06***	−.05***	−.11***	.07***	−.01	−.02	.02				47.2
15. Personal income (groups 1–13)	−.09*	−.12***	−.01	−.07**	−.03	−.13***	−.03	.04*	−.08***	.22***	.22***	.07***	−.17***	.23***			7.62
16. Education level (1–9)	.13***	.06***	.10***	.09***	.09***	.11***	.16***	.15***	.15***	−.05**	.11***	.14***	.11***	−.10***	.23***		5.83
17. Urban (dummy ref: medium town)	.12***	.03	.06*	.05*	.14***	.09***	.09***	.10***	.09***	−.08***	.12***	.05**	.03	−.09***	.09***	.17***	0.24
18. Rural (dummy ref: medium town)	−.01	−.00	−.05*	−.01	−.11***	−.09***	−.05**	−.09***	−.05**	−.01	−.12***	−.04**	.00	.12***	−.09***	−.14***	0.25
19. Live abroad (dummy ref: medium town)	−.08*	−.06*	−.02	−.00	.04	.02	.00	−.02	.00	.02	.11***	−.01	−.02	−.04*	−.02	.02	0.01
20. Fair (1–7)	.84***	.83***	.78***	.77***	.82***	.81***	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
21. Effective (1–7)	.75***	.74***	.70***	.74***	.74***	.75***	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
22. Affect personal freedom (1–7)	−.31***	−.38***	−.34***	−.31***	−.37***	−.29***	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
23. Affect personal economy (1–7)	−.23***	−.33***	−.28***	−.26***	−.32***	−.28***	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Significance levels: \*\*\* =  $p < .001$ , \*\* =  $p < .01$ , \* =  $p < .05$  (2-tailed test).

**Table 3.** Mechanisms of support for seven different policy types. OLS regressions (unstandardized coefficients).

	Air passenger tax		Frequent flyer tax		Biofuel blending mandate		Personal carbon allowances		High-speed train subsidy		Night train subsidy	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Personal norm	.43***	.17*	.28***	.01	.49***	.16***	.34***	.11*	.18*	.01	.26***	.06
Social norm	.13	-.02	-.03	.00	-.03	.04	.04	.00	.02	.00	.02	-.01
Climate concern	.34***	.12*	.37***	.04	.27***	.07*	.35***	.06	.20***	.01	.34***	.05
Political orientation (right)	-.24***	-.02	-.21***	-.03*	-.12***	-.06***	-.11***	-.02	-.18***	-.02	-.21***	-.05***
Number of flights	-.16***	-.05*	-.17***	.00	-.05*	-.01	-.11***	-.03*	.01	.00	-.01	.00
Institutional trust	.16*	-.01	.20***	-.01	.33***	.02	.17**	-.05	.32***	.02	.18***	-.01
Gender (0 man, 1 woman)	.29	.07	.24*	.15**	.18*	.10	.11	.10	.16	.06	.22*	.06
Age	-.01	.00	-.01	.00	.00	.00*	-.01	.00	-.02***	-.01**	.00	.00
Personal income	.01	.00	.00	.01	.03*	.01	.00	.00	.02	.01	-.03*	.00
Education level	.02	-.02	.00	-.03	-.01	-.02	.05	.00	-.01	.02	.04	.03
Urban	.25	.05	-.05	-.13*	-.02	.00	-.01	.08	.43***	.07	.00	-.04
Rural	.04	-.12	-.04	-.02	-.16	-.20***	.02	.02	-.27*	.05	-.35***	-.19**
Live abroad	-.74	-.26	-.67	-.43	-.05	.05	.06	.38	1.06*	.33	.15	.03
Fair		.63***		.62***		.51***		.48***		.64***		.58***
Effective		.34***		.33***		.35***		.41***		.35***		.36***
Affect freedom		-.02		-.03		-.04*		-.03		-.04*		-.06**
N	656	656	1633	1629	1569	1565	1599	1593	1589	1582	1550	1543
Adj. R <sup>2</sup>	.33	.77	.28	.75	.29	.70	.18	.70	.20	.73	.27	.73
Max. VIF	1.94	2.22	1.92	2.41	1.72	2.14	1.77	2.02	1.78	2.13	1.79	2.16

Significance levels: \*\*\* =  $p < .001$ , \*\* =  $p < .01$ , \* =  $p < .05$  (2-tailed test).

Climate concern is an important variable in all models, despite the inclusion in the regressions of the variable personal norm to act to reduce the individual's climate footprint. For both variables, the lowest coefficient is found for high-speed train subsidies, which could indicate that a preference for faster and better infrastructure may be motivated by other objectives such as convenience or economy (c.f. Jagers et al., 2016). In contrast, a perceived social norm, i.e. the degree to which other people in the respondent's vicinity are seen as believing individual climate action to be important, was not statistically significant for determining support for any of the tested measures, when tested alongside the other independent variables.

As could be expected, respondents who fly a lot are less supportive of policy instruments that would imply additional costs for air travel, particularly the two tax instrument proposals, but also for the biofuel mandate and personal carbon allowances. No effect on support for train subsidies was found from air travel frequency. Lastly, socio-demographic variables were found to have small effects in general. The most noteworthy exemption is for high-speed train subsidies, where urban respondents were found to be strongly in favour, whereas rural respondents were strongly opposed. High-speed train subsidy is also the only proposal where age is an important variable, young respondents being significantly more positive than older respondents. Both findings may be explained by self-interest, since the debate in Sweden about new high-speed rail networks has centred around the connection of Sweden's three main cities and the construction of new high-speed rail networks could take several decades to finish. Women tend to be somewhat more positive towards all policy instruments, but none of these correlations has a high statistical significance. Social class, as represented by personal income and education level, has a low statistical significance across all policy measures.

In the second model (Model 2), we included policy-specific beliefs, i.e. the extent to which the policy measure is perceived to be fair, effective, and affect personal freedom, respectively. When these variables were included, the adjusted  $R^2$  more than doubled for all of the policy measures, suggesting, in line with previous research (Drews & van den Bergh, 2016), that policy-specific beliefs are strongly associated with policy support, and that this is also the case regarding aviation policies. We noted that the effects of institutional trust and climate concern almost disappear completely across the different measures in Model 2. Perceptions of fairness, in particular, and effectiveness are very strong predictors for explaining overall support for a specific policy measure. Considering the correlation coefficients in Table 2, the positive associations between policy support and fairness range between .77 and .84, and for effectiveness between .70 and .75. We interpret this as an indication that these two policy-specific beliefs form the very foundation of a person's overall attitude – policy measures that are viewed as being fair and effective are simply viewed in positive terms. Interestingly, however, the extent to which the implementation of a policy measure is expected to affect one's own personal freedom was not found to be connected to the individual's overall attitude. This result contradicts previous research on attitudes towards higher taxes on petrol (Rienstra et al., 1999; Steg & Vlek, 1997). One interpretation is that tax on petrol can have implications for being able to use a car in one's everyday life, something which potentially could restrict individual freedom, while air travel for the most part is a transport mode used infrequently and mostly for non-necessary recreational travel. These patterns are similar for all policy alternatives: fairness is by far the strongest predictor, whereas freedom is not. These results are strikingly similar, even though we included a range of very diverse policy measures that at the outset could have been assumed to trigger somewhat different perceptions and attitudes.

## 5. Discussion

This article explores how, and through what mechanisms, public support for aviation policy measures varies between different policies. When interpreting the results regarding the absolute levels of support, where four out of seven policy measures have mean values well above the scale midpoint, the history of policy implementation in Sweden should also be considered. Previous research demonstrates how policy experience tends to increase policy support (Harring et al., 2019; Jagers et al., 2017). Sweden has a long history of both environmental taxation and other forms of governmental interventions, which makes Swedes somewhat more supportive of new policy proposals. Additionally, Swedes consistently show high levels of political and institutional trust, which further drives policy support.



Our result regarding political orientation was that people positioning themselves to the left are significantly more positive about all the policies included in the study. The largest difference was found for the two tax proposals and for the night train subsidy. However, although the effect of ideological orientation has been demonstrated in previous studies, how ideology affects policy support is still less understood. In part, ideological differences could be due to a general aversion towards state control and market interference, but it could, in part, also be a result of different interpretations of what freedom and fairness entails for example, and to what extent a proposed policy measure challenges these values (Jagers et al., 2018).

In our multivariate analysis we found that the ‘usual suspects’ (i.e. personal norms, climate concern, ideology, frequency of flying, and trust in institutions) initially appear significant, but that these effects are almost entirely subsumed by the inclusion of policy-specific beliefs in the models. Including policy-specific beliefs also strongly increases model-fit, suggesting that they add important components of support to the models. Furthermore, the effects of the variable measuring ‘number of flights’ (denoted as ‘greed’ in the study by Kantenbacher et al., 2018) is clearly weaker when the policy-specific beliefs are added to the models. Perceptions of a measure as fair and effective emerged as the factors most strongly associated with overall support, for all the different measures. Somewhat surprisingly, the effects of perceived fairness and effectiveness were almost identical across the policy measures we included, indicating that the formation of support is based on similar considerations, regardless of policy design. This is an interesting finding as we might expect different policy types with different features and targets to trigger different aspects of (non)-support.

However, it should be noted that analyzing support for novel policy designs is not straightforward. For measures that already exist or are familiar to the respondents due to having been implemented in other policy areas (such as subsidies and increased taxes on consumption), attitudes are probably more positive. For novel designs that are less familiar to the respondents and only seldom debated in the media, such as personal carbon allowances or a frequent flyer tax, the information required for the respondents to make an informed decision possibly exceeds the amount provided to them in this study. Thus, if knowledge and familiarity are issues, it would be relevant to repeat the study once these proposals have had further media attention.

Furthermore, the strong correlation between overall support and perceptions of fairness and effectiveness which applied across all policy types should be examined more closely. In part, more knowledge about what people consider constitutes a fair policy, and by which fairness principle they evaluate it (e.g. need, equality, equity, utility), is needed to better understand how perceptions of unfairness could be changed through policy design. However, we also need better methods for separating support from policy-specific beliefs, and for shedding light on the causal links between them. In short, are perceptions of fairness a driver for policy acceptance (‘it is fair, therefore I support it’), or even a component thereof (‘fair equals support’)? Or are policy-specific beliefs instead used as a justification for the individual’s overall attitude (‘I support it because it is fair’)?

## 6. Conclusions and policy implications

The climate impact of present day air travel has spurred both political debate and proposals for various policy measures. Previous studies focusing on other policy areas have demonstrated that policy decision making and implementation are sensitive to public opinion. As such, knowledge about the extent to which people lend their support to different types of aviation policy measures, and why, is crucial.

Using original data from Sweden we asked firstly if and how absolute levels of support vary between different types of measures. We found that less coercive pull-measures (i.e. subsidies and information) as well as regulatory measures targeting the aviation industry rather than individuals directly, were more readily supported. Subsequently, market-based policies aiming to push individuals away from air travel (i.e. taxes and emissions trading schemes) are comparatively poorly supported. This is much in line with what has been previously found from research in other policy areas as well as more specifically in a comparison of public attitudes to different aviation policy measures in the UK (Higham et al., 2016; Kantenbacher et al., 2018). Attitudes to a biofuel blending mandate, a policy measure that targets the aviation industry, have not been analysed before, and in this Swedish case, this received among the highest level of acceptance, much higher than e.g. taxes.

For policy makers, considering these results when selecting which policy types to focus on should provide valuable insights, not least as it is evident that broad public support is key both to short-term implementation and long-term survival of a policy. In the case of Sweden, which is the focus for this study, current policy development appears to correspond to our findings regarding policy support. The three policies with the highest support, night train subsidy, biofuel blending mandate and climate labelling, are all about to be implemented in Sweden (Swedish government, 2019). Carbon taxation on jet fuel for aviation based on bilateral/multilateral agreements within the EU is currently being investigated (European Commission, 2019; Pache, 2019a, 2019b). This policy would likely receive a high level of support since it is a policy that targets aviation industry instead of final consumers (Kantenbacher et al., 2018).

Secondly, we asked to what extent policy support varies from left to right on the ideological scale. We found that ideology does matter, as people positioning themselves to the left are significantly more positive about all the policies included in the study. This result is in line with previous research conducted in several countries (see Section 2). The attitudes of the voters positioning themselves in the centre are often crucial for whether the majority will support a specific policy or not.

Lastly, we examined the impacts on support for a measure of a range of previously tested factors to explore whether the drivers of support (or non-support) differ between policy measures. Climate concern, a personal norm to act in a more climate-friendly way, and high levels of institutional trust all display strong associations with support for all the different policies. These effects are, however, almost entirely overtaken by the factors of perceived fairness and effectiveness when these are included in the model. We conclude that policy measures that are viewed as being fair and effective are simply viewed in positive terms. The ability to design and frame the strong policies that are likely to be needed in the future in order to meet stringent climate targets, so that they will be perceived as both fair and effective, will be of crucial importance for achieving the necessary level of public support.

## Notes

1. Calculated as the Global Warming Potential over a time horizon of 100 years (GWP-100).
2. Different levels and offsets. In this study, we only use the low-level increase combined with a simultaneous tax cut (see Table 1 for how this was spelled out in the survey question), as this is one of the models for climate taxation that is currently being discussed both in Sweden and elsewhere.
3. The survey included two different tax levels, combined with three different revenue offsets as a 2 × 3 experiment (which will be analysed in a separate paper). For this study, however, we utilize only the lower tax level combined with a suggestion for using the revenues to lower other taxes for all, making the system revenue-neutral. Therefore, the number of respondents for this question is lower than for the other policy measures.
4. The responses to the latter two policy-specific beliefs (effects on personal freedom and finances, respectively) turned out to be strongly correlated ( $r = .84$ ). To avoid problems with multicollinearity, only personal freedom is included in the regression analyses.
5. The study was conducted in Sweden, which introduced a general aviation tax in 2018. Currently, the tax amounts to SEK 60 for flights within the EU and SEK 400 for international flights. The exchange rate is roughly 1:10, which means that the tax levels are about 6 and 40 Euro.

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